

provided to the ESMU, well prior to launch, for use within the radio astronomy community, pursuant to a confidentiality agreement.

**5.2.2.4 Case 4 - Protection of the RAS Observations in the Band 4990-5000 MHz from Spurious Emissions by MSS/RDSS Downlink Transmissions in the 2483.5-2500 MHz Band (DG2A Report §6.2.2)**

The Committee recommends that the spectral power flux-density (PFD) reaching the surface of the earth in the band 4990-5000 MHz from spurious emissions from all satellites in an MSS/RDSS system in the band 2483.5-2500 MHz not exceed  $-241 \text{ dB(W/m}^2\text{Hz)}$ .

The Committee believes that system operators can comply with this limit through a combination of suppression of second harmonics in satellite transmitters and filtering of the output.

The Committee recommends that prospective MSS/RDSS system operators establish that they can meet these requirements through analyses and testing. These analyses and test data should be provided to the ESMU, well prior to launch, for use within the radio astronomy community, pursuant to a confidentiality agreement.

**5.2.2.5 Case 5 - Protection of the Aeronautical Radionavigation Service (ARNS) in the 1610-1626.5 MHz Band (and, Specifically, the GLONASS System Operating under RR 732) from MSS/RDSS Uplinks in This Band and Case 5R - Protection of MSS/RDSS Systems from the ARNS (Including Aeronautical Radionavigation Radars Operating in Sweden under RR 731) in the 1610-1626.5 MHz Band**

**5.2.2.5.1 Reconfiguration of GLONASS frequency plan (DG2B Report §4.1)**

The Committee believes that the best solution to enable both MSS and GLONASS to operate compatibly without operational constraints is to effect a reconfiguration of the GLONASS frequency plan. As discussed in Section 3 of the DG2B Report, the Committee believes that this reconfiguration can be achieved without requiring modification of the GLONASS spacecraft design and without compromising the operational objectives for use of GLONASS as stated by the aviation community. In addition, this approach will also resolve much of the current interference from GLONASS experienced by radioastronomy.

To achieve this objective, the FCC, along with other appropriate U.S. government agencies, should initiate discussions with the Russian administration concerning this reconfiguration. Such an approach should also be made an integral part of any U.S.-Russia discussions concerning Article 14 coordination of GLONASS-M.

Absent an agreement on the part of the Russian Administration to shift or fold these frequencies as proposed in Sections 3.1.1 and 3.1.2 of the DG2B Report, less extensive adjustments to the GLONASS frequency plan should be pursued by the United States.

#### **5.2.2.5.2 Enhancing the GPS system to reduce need for protection of GLONASS (DG2B Report §4.2)**

The aviation community, within this proceeding, has emphasized its desire to use the GNSS as a "sole means" navigation system, for multiple applications. The aviation community should be asked to explore all possible alternatives to provide it the integrity and availability it seeks in the GNSS, including enhancement of the GPS system through the deployment of more GPS satellites, and use of other facilities. If protection of GLONASS to the extent sought by aviation is mutually exclusive with the operation of MSS systems, the Committee suggests that the FCC work with the aviation community to identify a means to use GPS with non-GLONASS augmentations to meet aeronautical navigation requirements.

#### **5.2.2.5.3 Adoption of e.i.r.p. limits for MSS/RDSS uplinks (DG2B Report §4.3)**

The Committee recommends that the Commission adopt the uplink e.i.r.p. density limits contained in RR 731E. Adopting these limits is necessary to enable the proposed MSS systems to be brought into use and support an important and beneficial U.S. initiative to provide mobile communications.

However, it is noted that the aviation community believes that adherence to the -15 dBW/4kHz limit will not assure protection to GLONASS for most aeronautical applications. If the Commission were to accept the aviation community's stated requirements for use of GLONASS as a component of a "sole means" GNSS, the co-primary MSS allocations in the 1610-1616 MHz band would be effectively nullified because of the disparity between aviation's protection requirements and practical e.i.r.p. levels needed to support satellite uplinks.

The FCC's adoption of such a rule does not imply protection of the GLONASS system to the extent desired by the aviation community.

#### **5.2.2.5.4 Restriction of use of mobile earth stations on aircraft (DG2B Report §4.5)**

In order to protect operations of GLONASS receivers and other navigational avionics on-board aircraft, the Commission should adopt a rule which prohibits the operation of mobile earth stations used with geostationary and non-geostationary satellites on civil aircraft, unless the MES has a direct connection to the aircraft Cabin Communication System.

#### **5.2.2.5.5 Conclusions for case 5R (DG2C Report §2.4)**

The Committee concludes that the Swedish radars operating in the ARNS at L band under RR 731, because of their sparse locations and pulsed operation, will not cause harmful interference to MSS operators with well designed receivers, nor will MSS operations interfere with them.

**5.2.2.6 Case 6 - Protection of GLONASS in the 1610-1616 MHz Band from Secondary MSS Downlinks in the 1613.8-1626.5 MHz Band (DG2B Report §4.4)**

The Committee finds that allocating the 1613.8-1626.5 MHz band to the MSS in the space-to-Earth direction on a secondary basis is consistent with sharing with GLONASS. In order to facilitate the operation of the secondary downlink in this band in a manner which will not cause harmful interference to GLONASS, space stations which utilize this band for downlink shall not exceed a power flux density of  $-141.5 \text{ dBW/m}^2\text{-4kHz}$  in the GLONASS operation band.

**5.2.2.7 Case 7 - Protection of the ARNS and Radionavigation-Satellite Service (RNSS) below 1610 MHz from Out-of-Band Emissions by MSS/RDSS Uplinks in the 1610-1626.5 MHz Band (DG2B Report §4.6)**

The Committee recommends that mobile units which operate with mobile-satellite systems utilizing any portion of the 1610-1626.5 MHz band should limit their out-of-band emissions so as not to exceed an e.i.r.p. density of  $-70 \text{ dBW/1MHz}$  averaged over any 20 ms period in any portion of the  $1575.42 \pm 1.023 \text{ MHz}$  band for broadband noise emission. For any discrete spurious emissions in the same band, i.e., bandwidth less than 600 Hz, the e.i.r.p. should not exceed  $-80 \text{ dBW}$ . The Committee was not able to reach a consensus on out-of-band emission limits to protect GLONASS. Such out-of-band limits will be considered following a determination of whether the GLONASS frequency plan can be revised or reconfigured. The aviation community is in agreement that the same MES out-of-band emission limits of  $-70 \text{ dBW/1MHz}$  broadband and  $-80 \text{ dBW}$  narrowband (i.e., bandwidth less than 600 Hz) should also apply to any portion of the GLONASS operation band below 1610 MHz.

**5.2.2.8 Case 8 - Protection of the ARNS and RNSS below 1610 MHz from Out-of-Band Emissions by Secondary MSS Downlinks in the 1613.8-1626.5 MHz Band**

The conclusions for this case are the same as those for Case 6, since it merely represents an extension of Case 6 to the ARNS/RNSS bands below 1610 MHz.

**5.2.2.9 Cases 9 and 9R - Frequency Sharing between the Fixed Service (FS) Operating under RR 730 and MSS/RDSS Uplinks in the 1610-1626.5 MHz Band (DG2C Report §2.1)**

The Committee finds that existing services in the band 1610-1626.5 MHz will not cause harmful interference to MSS operations. The Committee further finds that MSS operations will not cause harmful interference to any existing services in this band (other than RAS and ARNS, dealt with elsewhere). Accordingly, no rule changes or modifications are required.

**5.2.2.10 Cases 10 and 10R - Frequency Sharing between Secondary FS Systems (Operating under RR 727) and Secondary MSS Downlinks in the 1613.8-1626.5 MHz Band**

The Committee concludes that this sharing situation is not relevant to the United States. The IFL does not identify any secondary FS systems. In addition, the Committee was not able to obtain any other data on secondary FS operations in the countries cited in RR 727 to permit this case to be evaluated.

**5.2.2.11 Cases 11 and 11R - Frequency Sharing between the FS or Mobile Service (MS) and MSS Downlinks in the 2483.5-2500 MHz Band (DG2C Report §2.3)**

The Committee concludes that MSS could cause harmful interference to terrestrial fixed microwave and mobile radio services under some circumstances. The Committee expects that these circumstances will be infrequent and subject to coordination for systems operating above the PFD limit (RR 2566). The Committee also notes that there is no inherent technical reason why terrestrial fixed services need to operate in the frequency range 500-3000 MHz, whereas there are well known and fundamental reasons why the mobile services, using omnidirectional antennas, need to use this frequency band. Therefore, the Committee recommends that the FCC should take all steps necessary to have existing domestic FS systems in the band 2483.5-2500 MHz moved to higher carrier frequencies, i.e., above 3000 MHz. The Committee urges the FCC to work with U.S. and foreign administrations and international agencies to achieve the same ends throughout the world.

**5.2.2.12 Cases 12 and 12R - Out-of-Band Interference between the FS or MS Operating below 2483.5 MHz and MSS/RDSS Downlinks in the 2483.5-2500 MHz Band (DG2C Report §2.6)**

Except as otherwise mentioned, under the broad categories of fixed and mobile services (including the domestic broadcast auxiliary services (BAS)), the Committee did not find any systems likely to cause out-of-band interference to the MSS or to be interfered with. Out-of-band emissions from the BAS below 2483.5 MHz and the broadcasting-satellite service above 2500 MHz were deemed to be inconsequential and sporadic problems, and any problems that do arise with the fixed and mobile services should be easy to coordinate.

**5.2.2.13 Cases 13 and 13R - Out-of-Band Interference between the FS above 2500 MHz and the MSS/RDSS Downlinks in the 2483.5-2500 MHz Band (DG2C Report §2.2)**

The Committee finds that there will be no interference from MSS into the domestic ITFS/MMDS services, but that out-of-band emissions from the channels just above 2500 MHz in those services will cause harmful interference with MSS mobile terminals at distances up to several kilometers from a ITFS/MMDS transmitter. The Committee recommends that the FCC initiate an NPRM to tighten out-of-band ]

emissions to a level of at least 90 dB below the carrier level at an offset between 1.25 MHz and 2.0 MHz below 2500 MHz.

**5.2.2.14 Cases 14 and 14R - Out-of-Band Interference between the Broadcasting-Satellite Service (BSS) and Fixed-Satellite Service (FSS) Operating above 2500 MHz and MSS/RDSS Downlinks in the 2483.5-2500 MHz Band (DG2C Report §2.6)**

The Committee conclusions for these cases were covered in Sec 5.2.2.12 above.

**5.2.2.15 Cases 15 and 15R - Frequency Sharing between the Radiolocation Service (RLS) and MSS/RDSS Downlinks in the 2483.5-2500 MHz Band (DG2C Report §2.4)**

The Committee concludes that the French radars operating in this band, because of their sparse locations and pulsed operation, will not cause harmful interference to MSS operators with well designed receivers, nor will MSS operations interfere with them.

**5.2.3 Other Recommendations on Feeder Links**

**5.2.3.1 Application of RR 2613**

With regard to international application of RR 2613, the Committee recommends that the United States determine its obligations under RR 2613 in the following manner. Three conditions must be met before a non-geostationary system would be required to cease or reduce transmissions in order to protect a geostationary system. First, the administrations of the systems involved must engage in bi-lateral or multi-lateral discussions and reach agreement as to a level of "accepted interference" (see RR 162). Second, after the systems are in operation, the non-geostationary system must exceed the level of interference agreed to. Third, the interference in excess of the agreed level must be caused by the failure of the non-geostationary system to maintain sufficient angular separation between the satellites of the two systems. If any of these three conditions is not met, RR 2613 cannot be invoked to affect the operations of any non-geostationary satellites.

RR 2613, as interpreted by this Committee, provides existing non-geostationary satellite systems that operate in FSS bands with a necessary measure of protection against a demand from a future geostationary FSS system that they cease or reduce transmissions. A geostationary FSS system operator would be required to coordinate with existing non-geostationary systems to arrive at a level of "accepted" interference before any demand to cease or reduce transmissions resulting from "unacceptable" interference can be made -- a requirement that does not otherwise exist under the ITU regulations. This is a positive development for non-geostationary system operators around the world, and the Committee recommends that the United States seek the adoption of procedures to afford balanced protection for a non-GSO system from future systems. The United

States should seek to have the above interpretation of RR 2613 applied internationally.

No modifications to the Commission's rules would be needed in such cases with regard to international application of RR 2613. Section 25.111 requires applicants to provide the Commission with all information necessary to complete the IFRB processes, and subjects station licenses to additional terms and conditions pending the completion of applicable discussions with other Administrations. See 47 C.F.R. Section 25.111(b).

For purposes of the Commission's regulations, all that should be included for operators of non-geostationary and geostationary FSS systems licensed or to be licensed by the Commission is a requirement that affected operators coordinate their use of the shared bands. This requirement should take the form of a regulation in Part 25 of the FCC's rules that requires coordination between affected U.S. systems.

To address this situation, the Committee recommends that the Commission adopt proposed rules in section 5.1.3 of this report.

#### **5.2.3.2 Concerning the 5150-5250 MHz band:**

The Committee recommends that the FCC identify and/or allocate suitable spectrum below 15 GHz, and preferably below 10 GHz, for MSS/RDSS feeder links. A minimum of 66 MHz is required to accommodate the three MSS/RDSS applicants that have developed system designs based on use of the 5150-5216 MHz band. A 100 MHz band for MSS/RDSS feeder links would allow for growth of system capacity as additional antenna beams beyond the eight per satellite assumed for RDSS are added in the 1.6/2.4 GHz bands for service links to user terminals. Architecture and service concepts dictate that the necessary spectrum be free of large populations of geostationary satellites and that it be possible to establish low-cost feeder link (gateway) earth stations in the United States without burdensome coordination with terrestrial services. The spectrum must also be available for use both within and outside the United States without significant international coordination restrictions because of the likely expansion of the MSS/RDSS systems to global service.

If the FCC determines that the 5150-5250 MHz band is the only spectrum below 15 GHz which can satisfy the identified MSS/RDSS feeder link requirements, the Committee recommends that the FCC take appropriate steps with the Interdepartment Radio Advisory Committee (including the FAA) and the National Telecommunications and Information Administration (NTIA) to identify conditions that could allow sharing of that band with aeronautical radionavigation.

The FCC should make appropriate modifications to the Table of Allocations in Part 2 of its Rules and appropriate modifications to Part 25 of its Rules if a change in allocations is required to make available suitable spectrum for these MSS/RDSS feeder links.

In addition the FCC should take steps to include in proposals to future Radio Conferences revisions to the international Table of allocations consistent with any U.S. allocations for MSS/RDSS feeder links including related sharing criteria.

#### **5.2.3.3 20/30 GHz Sharing Criteria**

Sharing criteria should be developed and coordination methods applied to provide for coexistence of the LEO feeder link earth stations and the fixed services. It would appear that in the band 28.5-29.5 GHz a fixed terrestrial service sharing criteria which limits the fixed service transmitter eirp to 25.3 dBW/MHz at elevations of 9° or greater would protect the LEO satellite receivers. However, fixed-service interests were not represented in the Committee.

The Committee recognized that there will be a need for GSO/FSS and LEO systems to coordinate their use of the frequency bands, and noted that many of the rules necessary to achieve shared use of the FSS allocations for feeder link use already exist in Part 25 or are being proposed in a separate section of this Report. Section 25.111 requires applicants to provide the Commission with all necessary information for coordination purposes. Modification to Part 25 to provide for the geographic isolation of LEO earth stations is proposed. The Committee recognized that information regarding FSS antennas had not previously been requested. The Committee notes that geostationary FSS interests, other than NASA, were not represented on the Committee.

The Committee evaluated the FCC's pending rule-making proposal to establish the Local Multipoint Distribution Service ("LMDS") -- a cellular-like terrestrial service that would broadcast FM video and other signals between hubs spaced 12 miles apart on a grid and subscriber homes and businesses -- in the frequency bands 27.5-29.5 GHz. The Committee concluded that FSS systems and LMDS systems are unlikely to be able to operate compatibly in the same band, and that the establishment of the LMDS service would preempt the co-primary FSS service in 2000 MHz of the 2500 MHz allocation at 27.5-30.0 GHz, and also in 2000 MHz of the corresponding FSS downlink allocation at 17.7-20.2 GHz.

In light of the apparent inability of LMDS to share frequency bands with FSS systems (some of which are soon to be launched), and the substantial threat the proposal poses to the future of the FSS in the 20/30 GHz band, the Committee recommends that the FCC, if it is to establish the LMDS, do so in frequency bands that are not currently allocated to the FSS. The Committee notes that LMDS interests were not represented on the Committee.

As a consequence of the interfering situations described above it is recommended that the best way for the Iridium earth stations to coexist with the proposed LMDS is to exclude LMDS from 29.1-29.3 GHz (200 MHz) in the FSS allocation 28.5-29.5 GHz.

#### **5.2.3.4 Inter-satellite Service**

The FCC Rules, aside from the non-government allocations at 22.55-23.00 GHz, and 23.00-23.55 GHz in Section 2.106, do not explicitly address the inter-satellite service which is proposed for use by one of the MSS/RDSS applicants. Therefore it is recommended that the Rules 25.143, 25.202(3), and 25.208(c) contained in Section 5.1.3 of this Report be adopted.



**CHARTER FOR THE MSS ABOVE 1 GHz RULEMAKING COMMITTEE**

A. The Committee's Official Designation

The official designation of the advisory committee will be the "MSS Above 1 GHz Negotiated Rulemaking Committee."

B. The Committee's Objective and Scope of its Activity

The purpose of the committee is to provide recommendations to the Federal Communications Commission to be used in the formulation of technical rules governing the provision of mobile satellite services (MSS) operating in the 1610-1626.5 MHz (Earth-to-space), 1613.8-1626.5 MHz (space-to-Earth), and 2483.5-2500 MHz (space-to-Earth) frequency bands. The committee will also assist the FCC in resolving questions relating to (1) the maximum sharing of available frequencies for mobile satellite services, and (2) coordination of these services with existing and future terrestrial and/or satellite services, domestically and internationally. The scope of the activity of the committee will include all steps necessary to assemble data, perform analyses, and provide advice to the FCC concerning the technical and coordination issues presented by this satellite service.

C. Period of Time Necessary for the Committee to Carry Out Its Purpose

The committee will require 90 days to carry out its purpose.

D. Official to Whom the Committee Reports

Chief, Common Carrier Bureau, Federal Communications Commission.

E. Agency Responsible for Providing Necessary Support

The Federal Communications Commission will provide the necessary support for the committee, including facilities needed for the conduct of the meetings of the committee. Private sector members of the committee will serve without any government compensation, nor will they be entitled to travel expenses or per diem subsistence allowance.

F. Description of the Duties for Which the Committee is Responsible

The duties of the committee will be to gather and discuss information necessary to form recommendations to the FCC for the technical regulation and coordination of MSS systems in the 1610/2483 MHz bands.

G. Estimated Operating Costs in Dollars and Staff Years

Estimated staff years that will be expended by the committee are 0.6 for the FCC staff and 3.6 for the private sector and other governmental representatives. The estimated cost to the FCC of operating the committee is \$35,200.

H. Estimated Number and Frequency of Committee Meetings

We expect that there will be 12 meetings, with possibly more meetings of informal subcommittees.

I. Committee's Termination Date

The committee will terminate April 6, 1993.

J. Date Original Charter Filed

January 6, 1993.

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## Tentative Meeting Room Schedule

	Day	Date	Location	Hours	Full/Sub
1	Wed.	1/6/93	856	all day	Full
2	Thurs.	1/7/93	856	all day	Sub
3	Tues.	1/12/93	1330 Conn. Ave Concourse*	9:00 (all day)	Full
4	Wed.	1/13/93	1330 Conn. Ave Concourse*	9:30 - 5:00	IWG-1
5	Fri.	1/15/93	2000 L	all day	IWG-2
6	Tues.	1/26/93	856	9:30 - 5:00	IWG-2
7	Wed.	1/27/93	2300 N St., Ground Fl.	1:30 - 5:00	IWG-1
8	Thurs.	1/28/93	856	9:30 - 1:00	Full
9		1/28/93	1330 CT Ave., Concourse	2:00 - 5:00	IWG-1
10	Fri.	1/29/93	1350 I St., Conf A, LL	9:30	IWG-3
11	Thurs.	2/4/93	856	all day	IWG-1
12	Fri.	2/5/93	2000 L, 2nd fl. Trng Rm	9:30 - 5:00	IWG-3
13	Mon.	2/8/93	856	9:30 - 1:00	IWG-2
14	Wed.	2/10/93	1330 CT Ave., Concourse*	9:30 - 1:00	Full
15	Thurs.	2/11/93	1330 CT Ave., Concourse*	9:30 - 5:00	IWG-1
16	Tues.	2/16/93	856	all day	IWG-2
17	Wed.	2/17/93	856	all day	IWG-1
18	Thurs.	2/18/93	856	9:30 - 1:00	Sub
19		2/18/93	1350 I Street, LL	2:00 - 5:00	IWG-3
20	Thurs.	2/25/93	856	9:30 - 1:00	Full
21			856	1:30 - 5:00	IWG-2
22	Fri.	2/26/93	2000 L, Courtroom #4	all day	IWG-1
23	Tues.	3/2/92	856	all day	IWG-2 DGA&B
24	Wed.	3/3/93	1330 CT Ave., Concourse	all day	DG-1A
25	Thurs.	3/4/93	1330 CT Ave., Concourse	9:30 - 11:30	IWG-1
26			1330 CT Ave., Concourse	11:30 - 5:00	DG-1B
27			856	2:00 - 5:00	IWG-3
28	Fri.	3/5/93	COMSAT Early Bird Room	9:30 - 12:00	IWG-2
29			950 L'Enfant Plaza, S.W.	Drafting Groups in PM	
30	Tues.	3/9/93	856	9:30 - 1:00	Full
31			856	2:00 - 5:00	IWG-3
32	Wed.	3/10/93	1330 CT Ave., Concourse	9:30 - 3:00	DG-1B
33				3:00 - 9:00	DG-1A
34	Thurs.	3/11/93	2000 L	9:30 AM	DG-2A
35				1:00 PM	DG-2B
36			2300 N St.	9:30	DG-1A
37	Fri.	3/12/93	2300 N St.	9:30 - 11:30	IWG-1
38				12:00 noon	DG-1B
39	Mon	3/15/93	Comsat, 8th fl. Conf. Rm	9:30 - 2:00	IWG-2
40			950 L'Enfant Plaza, SW		
41	Tues.	3/16/93	1350 I Street, LL	9:30	IWG-3
42			2000 K St., 6th fl	9:30 - 3:00	DG-1A
43				3:00 - 9:00	DG-1B
44	Wed.	3/17/93	1330 CT Ave., Concourse	12:00 - 3:00	DG-1B
45				(possibly w/ 1A)	
46				3:00 - 9:00	DG-1A

1	Thurs.	3/18/93	856	9:30 AM	DG-2C
2				1:30 PM	DG-2B
3			2300 N Street	9:30	IWG-1
4	Mon.	3/22/93	2000 K St., Suite 600	9:30	IWG-3
5			1330 CT Ave., 9th fl	9:30	IWG-1-DGs
6	Tues.	3/23/93	856	all day	IWG-2
7	Wed.	3/24/93	2000 K St., N.W.	9:30 - 3:00	DG-1B
8				3:00 - 9:00	DG-1A
9			856	9:30	DG-2C, 2B
10	Thurs.	3/25/93	856	9:30 - 5:00	Full
11	Fri.	3/26/93	1330 CT Ave., 4th Floor	9:30 - 5:00	DG-1A,
12					DG-1B
13	Mon.	3/29/93	1350 I Street, LL	9:30 AM	IWG-3
14			2000 K St., NW, 6th fl	9:30 - 3:00	DG-1A
15				3:00 - 6:00	DG-1B
16			1330 CT Ave.	6:00 PM	IWG-1
17	Tues.	3/30/93	856	9:30 - 12:30	Full
18				1:30 - 5:00	IWG-2
19	Wed.	3/31/93	1330 CT Ave., Concourse	9:30 - 12:30	Full
20				1:30 PM	IWG-3
21	Thurs.	4/1/93	1330 CT Ave.	all day	IWG-1
22			2000 K St., NW, 6th Fl	2:00	IWG-3
23	Fri.	4/2/93	856	all day	Full
24	Mon.	4/5/93	856	all day	Full
	Tues.	4/6/93	1330 CT Ave., NW	Continuation of 4/5 Full - 9 AM	

**WORK PROGRAM -- MSS ABOVE 1 GHz NEGOTIATED RULEMAKING COMMITTEE**

Develop recommendations for FCC Rules in 47 C.F.R. Part 25 that address the technical aspects related to the selection and authorization of applicants to provide U.S. mobile satellite service (MSS) and radiodetermination satellite service (RDSS) in the 1610-1626.5 MHz and 2483.5-2500 MHz frequency bands, and to the shared use of those bands by authorized entities. Recommend any other technical modifications or new rules to the FCC rules as may be necessary to authorize MSS/RDSS systems in these bands.

If mutual exclusivity among the applicants in a particular category cannot be resolved, recommend technical criteria to select among applicants. In the alternative, discuss other selection mechanisms (e.g., lotteries, voluntary consortium).

**Working Group 1**

A. Recommend modifications to the existing rules for these bands (47 C.F.R. § 25.141), or new rules as necessary, to maximize multiple entry and to avoid or resolve mutual exclusivity among the non-geostationary satellite applicants, and between proposed non-geostationary and proposed or authorized geostationary satellite systems, while maintaining the economic viability of the systems. The following compatibility cases should be considered:

- (1) CDMA vis-a-vis CDMA MSS/RDSS systems;
- (2) CDMA vis-a-vis FDMA/TDMA MSS/RDSS systems;
- (3) FDMA/TDMA vis-a-vis FDMA/TDMA MSS/RDSS systems;
- (4) Non-geostationary MSS/RDSS systems vis-a-vis geostationary MSS systems;
- (5) Non-geostationary MSS/RDSS systems vis-a-vis geostationary RDSS systems.
- (6) Other MSS and RDSS satellite systems.

Recommend operating conditions and criteria necessary to protect primary MSS Earth-to-space links in the 1613.8-1626.5 MHz band from harmful interference from secondary MSS space-to-Earth links in the 1613.8-1626.5 MHz band, as required by 47 C.F.R. § 2.104 (d) (4).

### Working Group 2

- B. Recommend technical means for the domestic and international coordination of MSS/RDSS systems in these bands with the other services to which these bands are allocated, including:
- (1) Aeronautical radionavigation, including systems operating under the provisions of ITU RR 732 and ITU RR 731X (1610-1626.5 MHz band only);
  - (2) Radio astronomy, see ITU RR 733E and ITU RR 734 (1610.6-1613.8 MHz band only);
  - (3) Fixed and mobile.
- C. Recommend operating conditions and criteria necessary to protect primary services other than MSS in the 1613.8-1626.5 MHz band from harmful interference from secondary MSS space-to-Earth links in the 1613.8-1626.5 MHz band, as required by 47 C.F.R. § 2.104 (d) (4).

### Working Group 3

- D. Recommend modifications or new rules to the FCC Rules as may be necessary to accommodate feeder link and intersatellite link operations for MSS/RDSS systems, in particular with respect to the restrictions specified in ITU RR 2613.



MSS Above 1 GHz Negotiated Rulemaking Committee  
Document List

<u>Document Number</u>	<u>Brief Description</u>
MSSAC-0 (Final)	Document List
MSSAC-1 (Rev.1)	Committee Charter
MSSAC-2 (Rev.2)	Member List
MSSAC-3 (Final)	Tentative Meeting Room Schedule
MSSAC-4 (Rev.1)	Draft Work Program
MSSAC-5	Public Notice in CC Docket No. 92-166, DA 92-1085 (released August 7, 1992, requesting comments on the establishment of an advisory committee)
MSSAC-6	Public Notice, Report No. DS-1265, 57 FR 60781 (December 22, 1992), announcing formation of committee and meeting schedule
MSSAC-7	Public Notice, Report No. DS-1068, 6 FCC Rcd 2083 (1991), accepting initial applications, establishing cut-off for competing applications
MSSAC-8	Public Notice, Report No. DS-1134, 6 FCC Rcd 6002 (1991), accepting competing applications
MSSAC-9	Allocation NPRM, ET Docket No. 92-38, 7 FCC Rcd 6414 (1992)
MSSAC-10	Appendix B of Space Station Application Filing Procedures, 48 FR 40256 (September 9, 1983)

Current System Descriptions

MSSAC-11	AMSC - An Overview of American Mobile Satellite Corporation
MSSAC-12	Constellation Communications, Inc. - Current System Description
MSSAC-13	Ellipsat Corporation - The Ellipso Mobile Satellite System
MSSAC-13 (Annex)	Ellipso - Present Thinking On Design (1/12/93)
MSSAC-14	Loral Qualcomm Satellite Services, Inc. - LQSS Technical Description
MSSAC-15	Motorola, Inc. - IRIDIUM - Current System Description
MSSAC-16	TRW Inc. - TRW Odyssey Current System Description
MSSAC-17	Part 25 Rules on Satellite Communications
MSSAC-18	WARC 92 Final Acts excerpts

MSSAC-19	December 11, 1992 IFRB Circular-letter No. 921
MSSAC-20	Secs. 320 and 359(b) of Communications Act
MSSAC-21	Celsat, Inc. - Overview and Sharing Considerations
MSSAC-21 Annex	Celsat, Inc. - Viewgraph presentation
MSSAC-22	Celsat, Inc. - Technical Supplement
MSSAC-23	Joint Proposal (TRW, Ellipsat, Constellation)
MSSAC-24	Proposed Rule Provisions (Loral)
MSSAC-25	CCIR Fact Sheet (Study Group 7)
MSSAC-26	CORF Comments in ET Doc. 92-28
MSSAC-27	GLONASS - RTCA Paper No. 518-91/SC159-317
MSSAC-28	Full Committee Report Process
MSSAC-29 (Rev.1)	Elements of Consensus
MSSAC-29A (Rev.1)	Elements of Consensus - Viewgraphs
MSSAC-30	Comments on Elements of Consensus
MSSAC-31	Committee Operations and Procedures
MSSAC-32	Transcript of 1/6/93 meeting re: Consensus

MSSAC-40.1 series reserved for Full Committee Minutes

MSSAC-40.1 (Rev.1)	Minutes from January 6 and 12 Meetings
MSSAC-40.2 (Rev.1)	Minutes from January 28th Meeting
MSSAC-40.3 (Rev.1)	Minutes from February 10th Meeting
MSSAC-40.4	Minutes from February 18th Meeting
MSSAC-40.5 (Rev.1)	Minutes from March 9th Meeting
MSSAC-40.6	Minutes from March 25th Meeting
MSSAC-40.7	Minutes from March 30th meeting
MSSAC-40.8	Minutes from March 31st meeting
MSSAC-40.9	Minutes from April 2 & 5th meetings
MSSAC-40.10	Minutes from April 5th & 6th meetings

MSSAC-41.1 series reserved for Informal Working Group 1

MSSAC-41.1	Working Group 1 - Scope of Work report
MSSAC-41.2	Task & Milestone Schedule - IWG-1
MSSAC-41.3	Working Group 1 Report
MSSAC-41.4	IWG-1 Report (3/9/93)
MSSAC-41.5	IWG-1 Report (3/30/93)
MSSAC-41.6 (final)	"Final Report of the Majority of The Active Participants of Informal Working Group 1 to Above 1 GHz Negotiated Rulemaking Committee"

MSSAC-41.7 (final) "Report of Motorola on Band Segmentation  
Sharing to Working Group 1 of the Above 1 GHz  
Negotiated Rulemaking Committee"

MSSAC-41.8 (Rev.1) IWG-1 Final Report to the Committee

MSSAC-41.9 (final) IWG-1 Contribution to Final Report

MSSAC-42.1 series reserved for Informal Working Group 2

MSSAC-42.1 First Report of IWG-2 (2/25/93)

MSSAC-42.2 March 9th Report of IWG-2

MSSAC-42.3 March 25th Report of IWG-2

MSSAC-42.4 Second Revision of technical report of DG2A

MSSAC-42.5 Final Revision of technical report of DG2B

MSSAC-42.6 Final Revision of technical report of DG2C

MSSAC-42.7 (Rev.5) Report of Informal Working Group 2 (Inter-  
service Sharing Issues) to MSS Above 1 GHz  
Negotiated Rulemaking Committee

MSSAC-42.8 (Rev.1) IWG-2 Contribution to Final Report

MSSAC-43.1 series reserved for Informal Working Group 3

MSSAC-43.1 First Report of IWG-3

MSSAC-43.2 Second Report of IWG-3

MSSAC-43.3 Third Report of IWG-3

MSSAC-43.4 Section 4.1 of Report Text

MSSAC-43.5 unused

MSSAC-43.6 Section 4.3 of Report Text  
Feeder Links in bands other below 15 GHz

MSSAC-43.7 unused

MSSAC-43.8 Section 4.5 of Report Text  
Intersatellite links at 23 GHz band

MSSAC-43.9 unused

MSSAC-43.10 (Rev.1) IWG-3 Report to Full Committee

MSSAC-43.11 (Rev.2) IWG-3 contribution to Full Committee Report

MSSAC-44.0 series reserved for Full Committee Report

MSSAC-44.0 (Rev.1) Draft Outline of Committee Report

MSSAC-44.1 (Rev.1) Draft Introduction of Committee Report

MSSAC-44.2 (Rev.1) Summary

MSSAC 41.8 Rev1  
IWG1-78 Rev2  
April 6, 1993

REPORT OF INFORMAL WORKING GROUP 1 (INTRASERVICE SHARING)  
TO THE MSS ABOVE 1 GHZ NEGOTIATED RULEMAKING COMMITTEE

J. Gilseman, Coordinator IWG1

1. INTRODUCTION

1.1 Work Program.

The work program of Informal Working Group 1 (IWG1) was defined in the introduction and in part A of the full committee work program (see Doc MSSAC-4 (Rev. 1) as follows:

- . Develop recommendations for FCC Rules in 47 C.F.R. Part 25 that address the technical aspects related to the selection and authorization of applicants to provide U.S. mobile satellite service (MSS) and radiodetermination satellite service (RDSS) in the 1610-1626.5 MHz and 2483.5-2500 MHz bands, and to the shared use of those bands by authorized entities.
- . Recommend modifications to the existing rules for those bands (47 C.F.R. § 25.141), or new rules as necessary, to maximize multiple entry and to avoid or resolve mutual exclusivity among the non-geostationary satellite applicants, and between proposed non-geostationary and proposed or authorized geostationary satellite systems, while maintaining the economic viability of the systems. The following compatibility cases should be considered:
  - (1) CDMA vis-a-vis CDMA MSS/RDSS systems;
  - (2) CDMA vis-a-vis FDMA/TDMA MSS/RDSS systems;
  - (3) FDMA/TDMA vis-a-vis FDMA/TDMA MSS/RDSS systems;
  - (4) Non-geostationary MSS/RDSS systems vis-a-vis geostationary MSS systems;
  - (5) Non-geostationary MSS/RDSS systems vis-a-vis geostationary RDSS systems;
  - (6) Other MSS and RDSS satellite systems.
- . Recommend operating conditions and criteria necessary to protect primary MSS earth-to-space links in the 1613.8-1626.5 MHz band from harmful interference from secondary MSS space-to-earth links in the 1613.8-1626.5 MHz band, as required by 47 C.F.R. § 2.104 (d) (4).

## 1.2 Intraservice Sharing Approaches Considered.

Two basic approaches were considered to accommodate multiple entry and sharing among satellite systems: full band interference sharing and band segmentation. Several cases considering band sharing among the applicant and proposed satellite systems were evaluated under each approach.

## 1.3 Method of Work

Input papers and presentations describing the applicant systems and one proposed system, interference mechanisms, proposed sharing criteria, capacity/performance analyses and proposed sharing approaches were presented during full IWG1 meetings. An ad hoc technical group convened by Bill Borman, Motorola, identified relevant technical parameters which would be used for intraservice sharing studies and by IWG2 for its work. A second ad hoc group convened by Mike Ward, AMSC, analyzed material concerning potential interference from the secondary downlinks in the 1613.8-1626.5 MHz band. As the two basic approaches were clearly defined, two drafting groups were established:

- . IWG1 Drafting Group A (DG1A), chaired by Jay Ramasastry of Loral Qualcomm Satellite Services Inc., was given responsibility for all sharing issues under the full band interference sharing approach.
- . IWG1 Drafting Group B (DG1B), chaired by Bill Borman, Motorola, addressed sharing issues involving band segmentation.

Each drafting group had liaison responsibilities with IWG2.

## 1.4 Working Group Meetings and Participation.

IWG1 had twelve meetings with about forty people attending each meeting representing companies listed in the attached. Meetings were held on January 13, 27/28; February 4, 11, 17, 26; March 4, 12, 18, 24, 29 and April 1. The list of persons attending IWG1 and each of its drafting groups is given in Annex A.

## 1.5 Documentation.

The list of input documents to IWG1 was maintained by Norm Leventhal, Counsel for TRW and can be found at Annex B. Eighty five documents were produced.

Summaries of IWG1 meetings were prepared by Bill Wallace, Counsel for LQSS and are given in documents IWG1-30, 36, 46, 54, 66, 77 and 79.

A liaison report to IWG2 is contained in document 44.

Progress reports to the full committee are contained in documents MSSAC 41.1, 41.2, 41.3, 41.4, and 41.5.

2.0 Intraservice sharing considerations were examined by IWG1 and the results follow:

2.1 IWG1 was not able to reach full agreement on recommendations or modifications to the Commission's rules which would maximize multiple entry and avoid or resolve mutual exclusivity among the applicants.

2.2 Attachments 1 and 2 provide the results of the deliberations of IWG1 and will be useful to the FCC as the Rulemaking process continues. Attachment 1 is the "Report of the Majority of Active Participants" in IWG1 (AMSC, Celsat, Constellation, Ellipsat, Loral/Qualcomm and TRW) and describes the full band interference sharing and band segmentation approaches considered by IWG1 as well as suggested technical rules and recommendations for full band interference sharing. Attachment 2 is the "Report of Motorola" and describes several band segmentation approaches also considered by IWG1 as well as suggested technical rules and recommendations for the approach preferred by Motorola. Each attachment addresses intraservice sharing for several cases considered by IWG1. There was common agreement on several sections which appear in these attachments. These are discussed in the following paragraph.

2.3 Consensus was reached by IWG1 on text that described the applicant and proposed systems as well as two basic approaches to sharing the 1610-1626.5 MHz and 2483.5-2500 MHz bands: full band interference sharing and band segmentation. It also agreed on technical sharing criteria that might be applied among system operators under full band interference sharing as well as proposed uplink out of band emission limits and uplink emission limits that could be applied under band segmentation. It also agreed on downlink out of band emission limits for the bands 2483.5-2500 MHz and 1613.8-1626.5 MHz. Attachments 1 and 2 contain agreed upon text in Sections 1, 2 and 3. It should be noted that Sections 2

and 3 of Attachment 2 contain only the text related to band segmentation. IWG1 also agreed on system descriptions for sharing analysis including how technical parameters could be adjusted in order to improve performance of systems. See section 6 of the attached documents. There were also agreements reached in Section 7 of the attachments on the effects of sharing with services other than MSS/RDSS. Finally, although not included in agreed upon text, the participants in IWG1 agreed that the choice of orbit was not material to the ability to share spectrum if parameters are chosen appropriately.

#### Attachments.

1. IWG1-81 Rev1; MSSAC 41.6 Rev2. Report of the Majority of Active Participants of IWG1
2. IWG 1-85 Rev1; MSSAC 41.7 Rev2. Report of Motorola on Band Segmentation Sharing

#### Appendices.

- A. List of persons attending IWG1 and its drafting groups.
- B. List of input documents to IWG1.

Attachment 1  
To IWG1 Report (Annex 1)

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MSSAC-41.6  
(Final)  
IWG1-81  
(Final)

**Final Report**  
  
**of**  
  
**The Majority**  
  
**Of The Active Participants**  
  
**of**  
  
**Informal Working Group 1**  
  
**To**  
  
**Above 1GHz**  
  
**Negotiated Rulemaking Committee**  
  
**April 6, 1993**



The Final Report of the Majority of the Active Participants of Informal Working Group 1 to Above 1 GHz Negotiated Rulemaking Committee, MSSAC-41.6 (IWG1-81), is supported by the following entities:

American Mobile Satellite Corporation\*  
Celsat, Inc.  
Constellation Communications, Inc.  
Ellipsat Corporation  
Loral Qualcomm Satellite Services, Inc.  
TRW Inc.

\*By separate statement, AMSC concurs with the view that the Full Band Interference Sharing Approach under the technical parameters stated herein is a viable approach to facilitate multiple entry and equitable access to the full spectrum. This concurrence is without prejudice to the Elements of Consensus Approach.